

APPENDIX B

**A Review of Primary and Secondary Contact Recreation Beneficial Uses
Third Draft Technical Memorandum
Lower Boise River Watershed**

A Review of Primary and Secondary Contact Recreation Beneficial Uses

Third Draft Technical Memorandum

Lower Boise River Watershed

Prepared for
State of Idaho

by
Idaho Division of Environmental Quality, Boise Regional Office
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Introduction

This draft is the first of three technical memoranda that will be used to develop problem assessments for the Lower Boise River watershed, U.S. Geological Survey (USGS) hydrologic cataloging unit 17050114. The document is a technical review of recent water quality conditions with respect to the contact recreational uses of two water quality limited (WQL) stream segments in the watershed on the Boise River that are listed for bacteria or pathogens. The segments are the Boise River from Star to Notus, and from Notus to the Snake River. Those segments that are WQL and have been found to be impaired for recreational uses will require the development of a Total Maximum Daily Load (TMDL) allocation. Segments other than those that are WQL that have bacteria counts exceeding state criteria should also be addressed. For a small group of segments, no information is available, and monitoring is recommended.

Pollutants of Concern

Fecal coliform bacteria in a stream are the result of wastes from warm blooded animals. While fecal coliform bacteria are not a direct threat to health, fecal coliform concentrations have been demonstrated to correspond with pathogens in the water that threaten human health. Toxic substances may also impair recreational uses, and where data exist that substantiate such impairment, corrective action may also be necessary. The EPA suggests that a greater illness rate in swimmers is associated with median fecal coliform bacteria densities of greater than 400 colonies per 100 ml (EPA, 1992). The EPA recommendation is tempered by other studies in which fecal coliform bacteria densities are not well correlated with the incidence of illness in humans (Slaughterbeck and Trial, 1993). Thus, the risk potential of fecal coliform bacterial densities that slightly exceed the existing state criteria may only be moderate. The exact characterization of the risk associated with fecal coliform bacteria is not possible, and the interpretation of data demands appropriate professional judgement.

Both Primary (PCR) and Secondary (SCR) Contact Recreation beneficial uses have associated numeric criteria in Idaho's Water Quality Standards and Wastewater Treatment Requirements (IDHW, 1996). Loading allocations for recreation impaired WQL stream segments will be

developed with criteria for fecal coliform bacteria as the targets.

Contaminant Behavior in Streams

Fecal coliform bacteria are derived from the intestines of warm blooded animals, and are commonly found in animal feedlot runoff and municipal waste water treatment plant effluents. Wildlife, pastures, and urban storm-water can also be sources of bacteria.

It is possible that under the right combination of warm water temperatures and high organic loading, bacterial colonies may increase in number. However, the Boise River's water temperatures, low organic loads, and lack of shading are likely to preclude growth of bacteria. In the Boise River, bacteria generally die at an exponential rate that varies with water temperature and the intensity of sunlight. (Geldreich, et al., 1980). Most observers note that fecal coliform bacteria die at about twice the rate of fecal streptococci bacteria, which are also common in human and animal waste (Tetra Tech, 1985). One rate of die-off suggested for fecal coliform bacteria in the Boise River is 0.02 per hour in 68 degrees Fahrenheit water (Tetra Tech, 1985). As an example, that rate suggests that 1000 fecal coliform colonies per 100 ml of water would decline to a number just less than 500 colonies per 100 ml in 35 hours (about one and one half days).

State of Idaho Criteria for Contact Recreation

The recreational criteria of the state of Idaho are listed in IDAPA 16.01.02, section 250.01 of the current regulations (IDHW, 1996). For both Primary and Secondary Contact Recreation, all of the toxic substance criteria described in 40 Code of Federal Regulations (40 CFR), column D2 are applicable, with selected modifications specific to the state of Idaho.

Primary Contact Recreation (May 1 - September 30)

Defined as "surface waters which are suitable or intended to be made suitable for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such waters include, but are not restricted to, those used for swimming, water skiing, or skin diving." (IDHW, 1996)

Fecal coliform bacteria colonies:

- may not exceed 500/100 ml at any time
- may not exceed 200/100 ml in more than ten percent of the total samples taken over a thirty day period
- may not exceed a geometric mean of 50/100 ml based on a minimum of five samples taken over a thirty day period

Secondary Contact Recreation (All year)

Defined as: "surface waters which are suitable or intended to be made suitable for recreational uses on or about the waters and which are not included in the primary contact category. These waters may be used for fishing, boating, wading, and other activities where ingestion of raw water is not probable." (IDHW, 1996)

Fecal coliform bacteria colonies:

- may not exceed 800/100 ml at any time
- may not exceed 400/100ml in more than ten percent of the total samples taken over a thirty day period
- may not exceed a geometric mean of 200/100 ml based on a minimum of five samples taken over a thirty day period

Conclusions and Recommendations

The Division of Environmental Quality recommends that TMDLs for bacteria be developed for the lower Boise River segments from Star to Notus and Notus to the Snake River. In the segments just mentioned, ongoing measurements of fecal coliform bacteria denote recurring exceedences of state water quality criteria. Indian Creek downstream of New York Canal also has significant exceedences of contact recreation criteria. DEQ recommends that appropriate corrective actions should be identified and implemented to restore full support of primary and secondary contact recreation in Indian Creek. Two streams not listed as Water Quality Limited have quantities of fecal coliform bacteria greater than the contact recreation criteria, and should be addressed when management strategies for bacteria are developed.

Summary of Stream Segments

Stream Segment	Description	Listed for Bacteria?	Designation	Recommendation
Boise River	Lucky Peak Dam to Barber Diversion	NO	Primary and Secondary Contact Recreation	NO action required
Boise River	Barber Diversion to Star	NO	Primary and Secondary Contact Recreation	NO action required
Boise River	Star to Notus	YES	Primary and Secondary Contact Recreation	Develop TMDL for bacteria
Boise River	Notus to the Snake River	YES	Primary and Secondary Contact Recreation	Develop TMDL for bacteria
Blacks Creek	Headwaters to Boise River	NO	Unclassified Default Secondary Contact Recreation	Monitoring and possible corrective action for bacteria
Fivemile Creek	Headwaters to Fifteenmile Creek	NO	Secondary Contact Recreation	Additional monitoring
Tenmile Creek	Headwaters to Fifteenmile Creek	NO	Secondary Contact Recreation	NO action required

Mason Creek	Headwaters to the Boise River	NO	Unclassified Man Made Waterway	No action required
Upper Indian Creek	Headwaters to New York Canal	NO	Primary (to Sugar Avenue) and Secondary Contact Recreation	Monitoring
Lower Indian Creek	New York Canal to Boise River	NO	Primary and Secondary Contact Recreation	Corrective action for bacteria
Sand Hollow	Headwaters to the Snake River	NO	Unclassified Man Made Waterway	NO action required

Non-Listed Stream Segments

The following streams have fecal coliform bacteria problems that should be addressed when developing control strategies:

- Indian Creek, New York Canal to the Boise River
- Willow Creek
- Fifteenmile Creek

Characterization of Fecal Coliform Densities

Fecal Coliform bacteria occur in the Boise River during a wide variety of flow and water temperature conditions. High densities of bacteria are not limited to extremely high flows nor to very cold temperatures, and thus contact recreation may coincide with bacterial conditions that are in excess of state criteria.

Fecal Coliform Exceedences - Boise River, Star to Notus

Fecal coliform bacteria densities in excess of state criteria included three primary exceedences and one secondary exceedence. The measure values ranged from 630 / 100 ml to 830 / 100 ml. The flows associated with the exceedences are slightly less to slightly above the long term average flows for the months during which they occurred. The water temperatures associated with the exceedences ranged from 52 to about 64 degrees, which do not preclude contact recreation.

Fecal Coliform Exceedences - Boise River, Notus to the Snake

Fecal coliform densities in excess of state criteria ranged from 510 / 100 ml (only slightly above the primary contact instantaneous criterion) to 3600 / 100 ml. Eleven of the exceedences are between 500 and 1500 colonies per 100 ml, and the remaining exceedences are 2000, 3000, and 3600 colonies per 100 ml.

The flows associated with the coliform bacteria problems were predominantly lower than the long term average flow at the Parma gage for the month in which the exceedence occurred. Ten of the flows in which exceedences occurred were less than the long term monthly average flow at Parma, while the remaining four exceedences occurred during higher than long term average flow conditions. Water temperatures that associated with the fecal exceedences probably did not preclude contact recreation. Six of the primary exceedences were associated with water temperatures between 60 and 70 degrees Fahrenheit (F), one with a temperature greater than 70 degrees F, and the remaining six with temperatures between 50 and 60 degrees F.

Fecal Coliform Exceedences - Lower Indian Creek

Three sets of weekly fecal coliform bacteria measurements are available on Indian Creek, one upstream of the Nampa Waste Water Treatment Plant (WWTP) outfall, downstream of the Nampa outfall, and upstream of the Armour Fresh Meats facility. The Nampa data are collected downstream of Sugar Avenue, where Secondary Contact Recreation is designated. The range of secondary exceedences upstream is 900 to 5,700 colonies per 100 ml, while the downstream range of secondary exceedences is 900 to 14,300 colonies per 100 ml. The average density of coliform organisms upstream is 1167 per 100ml, and the downstream average is 1307 colonies per 100 ml. Bacteria counts in excess of state criteria have occurred in many months year after year. The Nampa data show that Indian Creek has on-going conditions that pose a risk of illness from ingestion of the water. Summary information related to the bacteria measurements in Indian Creek can be found in tables 18 and 19 in Appendix A. The Armour data show numerous exceedences of both the secondary and the primary instantaneous criteria for bacteria.

Boise River Segment One

Lucky Peak Dam to Barber Park

Contact Recreation Use Designations

Primary and Secondary

Available Data

One U.S. Geological Survey synoptic monitoring station, 13203510, located just downstream of the Diversion Dam, has data applicable to the segment. Thirty - seven (37) measurements of fecal coliform bacteria are available, spanning a time period from November 20, 1990 to August 17, 1998.

Coliform Measurements

All of the measured values are quite low, and no impairment of primary or secondary contact recreation is evident. No exceedences of applicable toxic substance criteria are evident

Recommendation

This segment's status is "Full Support" for both Primary and Secondary Contact Recreation.

Boise River Segment Two

Barber Diversion to Star

This segment extends from the Barber diversion to a point just upstream of the diversion near Star Road.

Contact Recreation Use Designations

Primary and Secondary

Available Data

Three USGS synoptic monitoring stations are applicable to the segment, one in the Boise River itself, and two in agricultural drains that flow into the river. Each of the three stations has fecal coliform measurements, but toxic substances are not monitored at any of the three sites. The number of measurements for a site is shown in parentheses ().

13206000	Glenwood Bridge	(55)	11/22/89	to	09/08/98
13206400	Eagle Drain	(6)	05/03/94	to	06/09/97
13208750	Thurman Drain	(6)	5/3/94	to	6/9/97

Coliform Measurements

One exceedence of both the primary and secondary instantaneous standards occurred on September 9, 1994 in the Boise River at the Glenwood Bridge site. Since all of the other measurements made at the site are less than state criteria, the single exceedence seems to be an anomaly.

Recommendation

This segment's status is "Full Support" for Primary and Secondary contact recreation.

Boise River Segment Three

Star to Notus

This segment of the lower Boise River begins at the diversion dam near Star Road, and extends to Notus.

Contact Recreation Use Designations

Primary and Secondary

Available Data

Nine USGS synoptic sites are applicable to the segment, including one site in the Boise river and eight sites in tributaries. Like the other stations noted above, the monitoring sites along this segment collect fecal coliform data, but no information on toxic substances. The number of measurements for a site is shown in parentheses ().

13210050	Boise River near Middleton	(34)	11/31/91	to	08/18/98
132108247	Mill Slough near Middleton	(11)	05/03/94	to	08/19/98
13210815	Fifteenmile Creek	(23)	05/04/94	to	08/19/98
13210835	Willow Creek at Middleton	(18)	05/02/94	to	06/10/97
13210850	Mason Slough	(6)	05/04/94	to	06/18/97
13210985	Mason Creek	(23)	05/04/94	to	08/19/98
13210986	West Hartley Gulch	(18)	05/05/94	to	06/10/97
13210987	East Hartley Drain	(18)	05/05/94	to	06/10/97
13211445	Indian Creek	(24)	05/05/94	to	08/17/98

Coliform Measurements

Three exceedences of the primary instantaneous criterion (500/100 ml), and one secondary exceedence (800/100 ml) are evident in the data for the Boise River near Middleton. West Hartley Gulch, East Hartley Drain, Mason Slough, Mason Creek, and Indian Creek all have multiple exceedences of both the primary and the secondary instantaneous criteria. The presence of so many drains and tributary confluences with very high fecal coliform counts along such as short length of the river suggests a possibility for exceedences in the Boise River near Caldwell.

Recommendation

This segment's status is "Not Full Support" for Primary and Secondary contact recreational uses. A TMDL for bacteria is needed for this segment.

Fifteenmile Creek, Willow Creek, and Indian Creek all have fecal coliform problems that should be addressed when developing bacteria management plans.

Boise River Segment Four

Notus to the Snake River

Contact Recreation Use Designations

Primary and Secondary

Available Data

Three USGS synoptic monitoring sites are applicable to the segment. One site is located in the Boise River near Parma, and two sites are located in tributaries. Fecal coliform bacteria data are available for the tributaries. The Boise River site near Parma includes both fecal coliform data and toxic substances data. The number of measurements for a site is shown in parentheses ().

13213000 Boise River near Parma	(74)	11/12/86	to	08/18/98
13212550 Conway Gulch	(23)	05/06/94	to	08/18/98
13212890 Dixie Drain	(23)	05/06/94	to	08/19/98

Coliform Measurements

Twenty-one (21) exceedences of the primary contact recreation criteria occur in the Boise River near Parma, and fourteen (14) exceedences of the secondary instantaneous criterion are evident in the data.

Recommendation

This segment's status is "Not Full Support" for both Primary and Secondary contact recreational uses. A TMDL for bacteria is needed for this segment.

Black's Creek

Headwaters to Black's Creek reservoir

Contact Recreation Use Designations

Black's Creek is an unclassified water body. The flow conditions of the stream during the primary contact recreation period are unlikely to allow full body immersion. On June 11, 1997, an unusually wet year, measured flow was 0.04 cubic feet per second (cfs). Flows observed on May 15, 1997 were estimated to be 2.0 to 3.0 cfs. The Creek probably dries up in late spring or early summer in all but the wettest years. Flows may be adequate to support secondary contact recreation between February and June.

Available Data

None

Coliform Measurements

None

Recommendation

The status of this segment is needs verification. The area adjacent to the stream is heavily grazed, especially in the lower reaches, and exceedences of secondary contact recreation criteria for bacteria are likely. Monitoring and possible corrective action for bacteria are recommended to support secondary contact recreation.

Fivemile Creek

Headwaters to Fifteenmile Creek

Contact Recreation Use Designations

Secondary. Flow conditions do not preclude Primary Contact Recreation.

Available Data

The data that characterize Fivemile Creek in terms of fecal coliform counts are available in a report prepared by CH2M Hill (1996) for the City of Meridian. Data are available for three sites on Fivemile Creek on April 12, 1995, August 16, 1995, and November 17, 1995. The monitoring sites are located upstream of the Meridian waste water treatment plant outfall, just downstream of the Meridian waste water outfall, and six miles downstream of the outfall.

Coliform Measurements

The data show one exceedence of Primary and one exceedence of Secondary Contact Recreation instantaneous criteria.

Recommendation

This segment's status is "Needs Verification" for both Primary and Secondary contact recreational uses. Additional monitoring is recommended to determine the support status of secondary contact recreation.

Upper Indian Creek

Headwaters to New York Canal

Contact Recreation Use Designations

Primary and Secondary

Available Data

None

Coliform Measurements

None

Recommendation

The status of this segment cannot be determined. Field monitoring is recommended for fecal coliform bacteria and flow.

Lower Indian Creek

New York Canal to the Boise River. Lower Indian Creek flows from Ada into Canyon County, through Nampa and Caldwell before joining the Boise River.

Contact Recreation Use Designations

Primary and Secondary

Available Data

One USGS synoptic monitoring site is located near the mouth of Indian Creek. The City of Nampa measures fecal coliform bacteria upstream and downstream of its WWTP outfall.

Coliform Measurements

- **13211445 Indian Creek at Mouth** (21) 5/4/94 to 8/13/97
- **Division of Environmental Quality** - 3 Samples on 7/11/94; upstream of Armour effluent, downstream of Armour effluent, and near Amity Road.
- **Armour Fresh Meats** - Reports weekly average upstream fecal Coliform, 6/92 - May 97. Samples are collected upstream of Sugar Avenue, where both primary and secondary contact recreation are designated.
- **City of Nampa** - weekly sampling upstream and downstream of the WWTP outfall, January, 1990 to the present.

Four values in the USGS data are in excess of both the Primary and Secondary instantaneous criteria. All three DEQ samples from July of 1994 revealed primary exceedences, two of which were also exceeded the secondary instantaneous criterion. The data collected by the city of Nampa show ongoing exceedences the secondary instantaneous and geometric mean criteria. The Armour Fresh Meats upstream monitoring data show 36 exceedences of the secondary instantaneous criterion, and 20 exceedences of the primary instantaneous criterion. The exceedences evident in the Nampa data are summarized below:

Upstream, January, 1990 to March, 1997

113 exceedences of the Secondary instantaneous criterion
26 exceedences of the Secondary geometric mean

Downstream, January, 1990 to March, 1997

95 exceedences of the Secondary instantaneous criterion
23 exceedences of the Secondary geometric mean

Recommendation

This segment's status is "Not Full Support" for both Primary and Secondary contact recreational uses. Corrective actions for bacteria problems are recommended to support Primary and Secondary Contact Recreation.

Mason Creek

Mason Creek is a highly manipulated channel that crosses the New York and Ridenbaugh canals, flows through Nampa, and eventually joins the Boise River just upstream of Caldwell. This segment is a man made waterway protected only for agricultural water use.

Contact Recreation Use Designations

This segment is unclassified.

Available Data

One USGS synoptic monitoring site is located near the mouth of Mason Creek.

13210985 Mason Creek at Mouth (20) 5/4/94 to 8/13/97

Coliform Measurements

Not relevant to a man made waterway

Recommendation

No action is required with respect to contact recreation.

Tenmile Creek

Headwaters to Fifteenmile Creek

Tenmile Creek flows past the City of Meridian and later joins Fivemile Creek to form Fifteenmile Creek.

Contact Recreation Use Designations

Secondary, but flows do not preclude Primary Contact Recreation

Available Data

Three measurements of fecal coliform bacteria are available from the same CH2M Hill (1996) study referenced on the Fivemile Creek summary page. The measurements were collected on August 12, 1995, August 16, 1995 and November 17, 1995.

Coliform Measurements

None of the values exceed the instantaneous criteria for Primary and Secondary contact recreation.

Recommendation

This segment's status is 'Full Support' for Secondary Contact Recreation.

Sand Hollow

Sand Hollow flows from the foothills north of the Boise River to a point in between Notus and Parma, where it turns west - northwest and flows into the Snake River. This segment is a man made waterway protected only for agricultural water use.

Contact Recreation Use Designations

This segment is unclassified

Available Data

None

Coliform Measurements

None

Recommendation

No action is required with respect to contact recreation.



References

- CH2M Hill, 1996. Field Assessment of Biological, Physical, and Chemical Conditions of Fivemile Creek in the Vicinity of the City of Meridian's Waste Water Treatment Facility. CH2M Hill, Boise, ID.
- Feachem, R., 1975, "An Improved Role for Fecal Coliform to Fecal Streptococci Ratios in the Differentiation Between Human and Non-Human Pollution Sources," Water Research, Vol. 9, pp. 689-690.
- Geldreich, Edwin E., 1967, "Fecal Coliform Concepts in Stream Pollution," Water Sewage Works, 114, pp. R98 - R109.
- Geldreich, Edwin E., March, 1973, "The Use and Abuse of Fecal Streptococci in Water Quality Measurements," in Proceedings of the First Microbiology Seminar on Standardization of Methods, U.S. Environmental Protection Agency, EPA-R4-73-022.
- Geldreich, Edwin E., and Bernard A. Kennner, August, 1969, "Concepts of Fecal Streptococci in Stream Pollution," Journal of the Water Pollution Control Federation, Vol. 41, No. 8, Part 2, pp. R336-R351.
- Geldreich, Edwin E., Harry D. Nash, Donald F. Spino, and Donald J. Reasoner, January, 1980, "Bacterial Dynamics in a Water Supply Reservoir: A Case Study," Journal of the American Water Works Association, pp. 31 - 40.
- Idaho Department of Health and Welfare, 1996. Idaho Department of Health and Welfare Rules IDAPA 16 Title 1, Chapter 2: Water Quality Standards and Wastewater Treatment Requirements. Idaho Office of the State Auditor, Division of Statewide Administrative Rules. Boise, ID.
- Lin, Shundar, Ralph L. Evans, and Davis B. Beuscher, August, 1974, "Bacteriological Assessment of Spoon River Water Quality," Applied Microbiology, pp. 288-297.

Rates, Constants, and Kinetics Formulations in Surface Water Quality
Modeling, June, 1985, Chapter Eight, Coliform Bacteria, Tetra Tech,
Inc., pp. 424 - 455.

Slaughterbeck, Carol, and Willy Trials, March, 1993, Pipers Creek
Bacteriological Source Tracking Investigation, Herrera Environmental
Consultants, Inc., prepared for the Seattle Engineering Department
Drainage and Wastewater Utility.

U.S. Geological Survey. Data from Lower Boise River Water Quality
Plan. Boise, ID.

U.S. Environmental Protection Agency, July, 1992, Summary of State
Water Quality Standards for Bacteria, Water Policy Branch,
Washington, D.C.

Appendix A - Fecal Coliform Data

All data displayed are from U.S. Geological Survey synoptic monitoring sites.

K = estimated value

Table I. Boise River below Diversion Dam

Boise River Below Diversion Dam			
USGS 13203510			
Date	Discharge cfs	Fecal Coliform # / 100 ml	Fecal Streptococci # / 100 ml
11/20/90	175	<1	k3
01/18/91	160	<1	k3
03/28/91	177	<1	k4
05/22/91	1350	k1	k4
07/23/91	737	k1	k1
09/11/91	1640	k5	150
11/03/93	258	<1	80
01/18/94	245	k4	k4
03/10/94	210	k12	k6
05/11/94	1770	k1	k3
07/20/94	620	k1	k3
09/13/94	2010	k2	N/A
11/14/94	161	k2	N/A
04/13/95	1420	k2	N/A
04/26/95	4640	<1	N/A
05/16/95	4610	<1	N/A
06/12/95	2610	k1	N/A
08/14/95	1830	<1	N/A
10/19/95	337	<1	N/A
12/07/95	200	k5	N/A
02/13/96	4000	<1	N/A
04/11/96	5900	<1	N/A
05/15/96	4630	<1	N/A
06/12/96	7800	k3	N/A
08/21/96	2100	<1	N/A
10/21/96	321	k3	N/A
12/16/96	240	k1	N/A
02/10/97	7010	k2	N/A
04/14/97	N/A	<1	<1
06/09/97	N/A	k2	>2
07/14/97	N/A	k1	0
08/11/97	N/A	<1	<1
10/20/97	306	k2	k3
12/15/97	249	<1	<1
4/6/98	1630	k2	k3
5/11/98	3930	k1	k3
7/13/98	N/A	N/A	N/A
8/17/98	N/A	k1	k4

Table 2. Boise River at Glenwood Bridge

Boise River at Glenwood Bridge				Two Primary exceedences
USGS 13206000				One Secondary exceedence
		Fecal	Fecal	
Date	Flow	Coliform	Streptococci	
	cfs	# / 100 ml	# / 100 ml	
11/22/89	185	25	k17	
01/16/90	167	k2	k3	
03/16/90	147	k4	k16	
05/29/90	850	>200	>330	
07/09/90	736	49	44	
09/21/90	491	70	68	
11/19/90	169	29	40	
01/17/91	154	37	350	
03/28/91	157	k7	42	
05/22/91	602	k9	26	
07/23/91	944	41	73	
09/11/91	574	k310	98	
11/12/91	153	27	210	
01/21/92	134	k18	260	
03/18/92	114	k10	46	
05/14/92	732	22	50	
07/20/92	608	54	170	
09/11/92	287	180	k1200	
11/02/92	83	190	350	
01/07/93	71	44	130	
05/12/93	2570	k9	29	
08/06/93	1130	100	100	
09/14/93	626	k5	160	
01/19/94	336	140	k15	
03/04/94	248	140	59	
05/13/94	806	k20	110	
07/12/94	1260	k28	k22	
09/09/94	398	k1000	k1200	Primary Secondary
11/10/94	188	42	150	
03/20/95	167	41	78	
04/13/95	923	k22	N/A	
04/26/95	3450	26	N/A	
05/16/95	3990	62	91	
06/12/95	1710	k33	N/A	
07/21/95	1040	57	31	
08/14/95	790	45	N/A	
09/19/95	811	100	110	
10/19/95	337	68	N/A	
12/07/95	235	58	N/A	

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Boise River at Glenwood Bridge			
USGS 13206000			
Date	Flow cfs	Fecal	Fecal
		Coliform # / 100 ml	Streptococci # / 100 ml
02/13/96	3760	k12	N/A
04/11/96	5960	k7	k18
05/16/96	3790	100	350
06/11/96	5060	k14	31
07/12/96	1340	20	42
08/21/96	1250	47	35
09/24/96	743	45	61
10/21/96	386	k40	N/A
12/16/96	446	k42	N/A
02/10/97	6860	k4	N/A
4/15/97	6900	k8	k12
5/23/97	N/A	45	56
6/9/97	4320	30	72
7/16/97	1320	95	k7
8/11/97	1840	92	73
9/8/97	1420	400	620
10/20/97	446	75	k40
12/15/97	264	26	360
4/6/98	1940	k5	11
5/11/98	3290	300	980
6/12/98	5540	32	k3
7/13/98	2360	<1	<1
7/13/98	1200	k16	k11
8/17/98	N/A	640	55
9/18/98	N/A	290	760

Time:

930

1335

Primary

Tables 3 & 4. Eagle Drain and Thurman Drain

Eagle Drain at Eagle			
USGS 13206400			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/03/94	39	k370	N/A
11/15/94	13	k81	N/A
05/17/95	29	240	N/A
12/05/95	11	k3500	N/A
05/14/96	29	3400	N/A
06/09/97	N/A	440	>750

Thurman Drain at Mouth near Eagle			
USGS 13208750			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/03/94	29	2800	N/A
11/15/94	10	160	N/A
05/18/95	14	280	N/A
12/07/95	14	340	N/A
05/14/96	14	3500	N/A
06/09/97	N/A	k120	>250

Table 5. Boise River near Middleton

Boise River near Middleton				Three Primary exceedences One Secondary exceedence
USGS 13210050		Fecal	Fecal	
Date	Flow	Coliform	Streptococci	
	cfs	# / 100 ml	# / 100 ml	
11/13/91	241	37	400	
01/23/92	212	51	370	
03/18/92	174	k350	190	
05/11/92	169	97	130	
07/21/92	178	<190	k1000	
09/11/92	161	99	k2700	
05/12/94	234	200	300	
11/09/94	258	48	350	
03/10/95	224	33	58	
04/13/95	765	100	N/A	
04/28/95	3630	290	N/A	
05/17/95	3760	120	71	
06/13/95	1160	140	N/A	
07/20/95	871	54	72	
08/15/95	573	270	N/A	
09/11/95	417	100	44	
10/19/95	356	76	N/A	
12/05/95	382	k36	N/A	
02/14/96	4000	k15	N/A	
04/11/96	4800	k31	N/A	
05/15/96	3240	k630	N/A	Primary
06/13/96	4690	240	N/A	
08/22/96	620	640	N/A	Primary
10/24/96	412	k64	N/A	
12/16/96	342	46	N/A	
04/16/97	N/A	k43	k47	
06/12/97	N/A	300	300	
07/15/97	N/A	270	90	
08/11/97	N/A	830	470	Primary Secondary
10/21/97	321	70	k140	
12/16/97	360	96	k57	
4/7/98	1840	38	89	
7/14/98	680	k39	90	
8/18/98	N/A	110	190	

Table 6. Fifteenmile Creek near Eagle

Fifteenmile Creek at Mouth near Middleton			
USGS 13210815			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/04/94	116	700	N/A
11/16/94	23	600	N/A
04/11/95	83	1700	N/A
04/24/95	110	1400	N/A
05/17/95	119	650	N/A
06/15/95	89	k770	N/A
08/17/95	99	560	N/A
10/17/95	62	200	N/A
12/05/95	36	610	N/A
02/14/96	37	k63	N/A
04/11/96	118	940	N/A
05/16/96	199	k7100	N/A
06/13/96	104	k400	N/A
08/20/96	147	660	N/A
10/21/96	60	210	N/A
12/19/96	33	180	N/A
02/13/97	51	150	N/A
06/12/97	N/A	2100	2600
07/16/97	N/A	k800	k34
08/13/97	N/A	k1500	7700
12/18/97	29	k120	450
5/12/98	N/A	1300	4900
8/19/98	N/A	1400	8100

Tables 7 & 8. Mill Slough and Willow Creek

Mill Slough below Grade Ditch near Middleton			
USGS 132108247			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/03/94	139	620	N/A
11/15/94	66	140	N/A
05/12/95	157	1000	N/A
12/05/95	65	160	N/A
05/13/96	116	1700	N/A
06/10/97	N/A	630	>800
07/15/97	N/A	k750	k40
08/12/97	N/A	540	k3200
12/18/97	54	200	1100
5/11/98	207	1300	4200
8/19/98	N/A	250	1000

Willow Creek at Middleton			
USGS 13210835			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
5/2/94	75	k1300	N/A
11/17/94	2	k5600	N/A
4/18/95	82	500	N/A
4/26/95	56	2200	N/A
5/12/95	118	860	N/A
6/7/95	46	780	N/A
8/14/95	18	1300	N/A
10/16/95	33	230	N/A
12/4/95	2	280	N/A
2/12/96	41	k110	N/A
4/8/96	20	350	N/A
4/25/96	121	1400	N/A
5/13/96	27	2600	N/A
6/11/96	42	4500	N/A
10/22/96	32	210	N/A
12/18/96	939	k10	N/A
2/12/97	299	100	N/A
6/10/97	N/A	430	>650

Tables 9 & 10. Mason Slough and Mason Creek

Mason Slough at Mouth near Caldwell			
USGS 13210850			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/04/94	21	860	N/A
11/16/94	12	780	N/A
05/15/95	15	2300	N/A
12/07/95	9	k70	N/A
05/14/96	42	45000	N/A
06/18/97	N/A	k1700	1200

Mason Creek at Mouth near Caldwell			
USGS 13210985			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/04/94	126	100	N/A
11/16/94	47	k86	N/A
04/12/95	28	88	N/A
04/24/95	75	280	N/A
05/15/95	116	680	N/A
08/17/95	168	630	N/A
10/17/95	84	k78	N/A
12/07/95	61	2200	N/A
02/16/96	62	k180	N/A
04/09/96	59	550	N/A
04/26/96	92	450	N/A
05/14/96	121	2100	N/A
06/12/96	124	2200	N/A
08/20/96	139	k6800	N/A
10/24/96	93	k300	N/A
12/18/96	58	k33	N/A
02/12/97	77	330	N/A
06/11/97	N/A	3100	3500
07/16/97	N/A	k1200	830
08/13/97	N/A	k640	9900
12/18/97	65	k240	690
5/12/98	208	2600	>2700
8/19/98	N/A	880	4900

Table II. West Hartley Gulch

West Hartley Gulch near Caldwell			
USGS 13210986			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/05/94	30	720	N/A
11/17/94	8	170	N/A
04/11/95	5	150	N/A
04/25/95	11	560	N/A
05/11/95	23	320	N/A
06/07/95	40	1900	N/A
08/15/95	44	1000	N/A
10/16/95	14	k76	N/A
12/04/95	7	140	N/A
02/12/96	8	k110	N/A
04/08/96	5	k47	N/A
04/25/96	22	510	N/A
05/13/96	28	5100	N/A
06/11/96	31	1000	N/A
10/22/96	15	210	N/A
12/18/96	8	k59	N/A
02/12/97	8	240	N/A
06/10/97	N/A	510	>1100

Table 12. East Hartley Gulch

East Hartley Drain near Caldwell			
USGS 13210987			
Date	Flow	Fecal	Fecal
		Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/05/94	64	1100	N/A
11/18/94	23	150	N/A
04/11/95	16	280	N/A
04/25/95	25	1000	N/A
05/11/95	50	2300	N/A
06/07/95	66	3800	N/A
08/15/95	95	1900	N/A
10/16/95	63	k200	N/A
12/04/95	25	210	N/A
02/12/96	22	k18	N/A
04/08/96	17	k67	N/A
04/25/96	34	590	N/A
05/13/96	63	5000	N/A
06/11/96	71	2600	N/A
10/22/96	40	k100	N/A
12/18/96	22	k69	N/A
02/12/97	13	k6	N/A
06/10/97	N/A	4600	>2500

Table I3. Indian Creek at Mouth near Caldwell

Indian Creek at Mouth near Caldwell			
USGS 13211445			
Date	Flow cfs	Fecal Coliform # / 100 ml	Fecal Streptococci # / 100 ml
05/05/94	75	1300	N/A
11/17/94	162	220	N/A
04/12/95	92	370	N/A
04/24/95	100	240	N/A
05/16/95	167	280	N/A
06/12/95	83	440	N/A
08/17/95	33	1200	N/A
10/17/95	150	k130	N/A
12/06/95	201	260	N/A
02/13/96	207	k110	N/A
04/09/96	102	290	N/A
04/26/96	101	190	N/A
05/16/96	151	3000	N/A
06/11/96	55	680	N/A
08/20/96	76	920	N/A
10/22/96	256	370	N/A
12/17/96	204	k130	N/A
02/11/97	214	130	N/A
06/11/97	N/A	590	850
07/16/97	N/A	k540	k140
08/13/97	N/A	640	2100
12/17/97	213	k220	k18000
5/13/98	206	640	1500
8/17/98	N/A	67	430

Table 14. Conway Gulch

Conway Gulch at Notus			
USGS 13212550			
		Fecal	Fecal
Date	Flow	Coliform	Streptococci
	cfs	# / 100 ml	# / 100 ml
05/06/94	40	440	N/A
11/18/94	23	100	N/A
04/12/95	17	k44	N/A
04/25/95	31	k110	N/A
05/18/95	42	540	N/A
08/16/95	47	1600	N/A
10/18/95	27	k43	N/A
12/06/95	19	k17	N/A
02/15/96	31	k8	N/A
04/09/96	14	160	N/A
04/24/96	40	150	N/A
05/16/96	52	2900	N/A
06/10/96	52	640	N/A
08/20/96	50	k460	N/A
10/23/96	33	k53	N/A
12/17/96	20	k43	N/A
02/10/97	19	440	N/A
06/18/97	N/A	k490	1900
07/15/97	N/A	k470	390
08/12/97	N/A	440	k14000
12/16/97	21	k27	9600
5/13/98	43	230	930
8/18/98	N/A	>4000	8600

Table 15. Dixie Drain

Dixie Drain near Wilder			
USGS 13212890			
Date	Flow cfs	Fecal	Fecal
		Coliform # / 100 ml	Streptococci # / 100 ml
05/06/94	219	k6100	N/A
11/18/94	81	270	N/A
04/18/95	162	420	N/A
04/27/95	183	6400	N/A
05/19/95	182	k9000	N/A
08/16/95	222	k1500	N/A
10/18/95	196	370	N/A
12/06/95	81	320	N/A
02/15/96	85	2200	N/A
04/10/96	166	1300	N/A
04/24/96	240	k3000	N/A
05/17/96	370	5900	N/A
06/10/96	219	2300	N/A
08/21/96	154	k1000	N/A
10/23/96	166	k210	N/A
12/17/96	76	k160	N/A
02/11/97	92	260	N/A
06/18/97	N/A	1900	1800
07/16/97	N/A	1400	k120
08/12/97	N/A	1200	k3300
12/17/98	85	160	1800
5/14/98	349	1800	1300
8/19/98	N/A	900	1800

Table 16. Boise River near Parma

Boise River near Parma				21 Primary exceedences	
USGS 13213000				14 Secondary exceedences	
		Fecal	Fecal		
Date	Flow	Coliform	Streptococci		
	cfs	# / 100 ml	# / 100 ml		
11/12/86	2250	100	410		
01/22/87	827	k27	k300		
03/19/87	929	220	1100		
05/28/87	1270	2000	1500	Primary	Secondary
07/27/87	549	k320	900		
09/09/87	733	400	1400		
11/23/87	906	76	480		
01/13/88	761	250	2900		
03/14/88	667	43	k150		
05/23/88	380	1000	1900	Primary	Secondary
07/20/88	258	k1000	3400	Primary	Secondary
09/21/88	514	480	2400		
11/10/88	842	190	1600		
01/20/89	723	530	k11000		
03/13/89	1130	210	3100		
05/08/89	1390	1100	770	Primary	Secondary
07/05/89	543	240	470		
08/29/89	1100	270	2100		
11/16/89	950	150	290		
01/30/90	1420	180	430		
03/26/90	323	k49	k97		
05/21/90	830	980	1400	Primary	Secondary
07/12/90	309	510	1200	Primary	
09/17/90	784	350	1300		
11/21/90	888	400	510		
01/16/91	932	1000	k54000		Secondary
03/25/91	587	300	650		
05/20/91	1400	540	1000	Primary	
07/22/91	608	N/A	970		
09/10/91	796	620	6700	Primary	
11/14/91	808	k62	370		
01/22/92	660	260	590		
03/17/92	564	220	350		
05/12/92	308	780	380	Primary	
09/08/92	170	220	k7800		
11/03/92	648	k74	260		
01/05/93	576	k35	290		
05/13/93	2170	590	240	Primary	
09/08/93	772	260	1900		

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Boise River near Parma					
USGS 13213000					
		Fecal	Fecal		
Date	Flow	Coliform	Streptococci		
	cfs	# / 100 ml	# / 100 ml		
11/02/93	981	k70	1500		
01/04/94	859	550	2400		
03/01/94	800	k1000	k25		
05/10/94	587	1000	610	Primary	Secondary
09/07/94	444	330	1700		Secondary
11/08/94	779	420	k140		
02/15/95	686	92	200		
04/14/95	1270	250	N/A		
04/27/95	3560	k750	N/A		
05/18/95	4380	k400	120		
07/19/95	1420	270	1300		
08/16/95	1080	k670	N/A	Primary	
10/18/95	942	150	N/A		
12/05/95	935	190	N/A		
02/15/96	5360	250	N/A		
04/10/96	6360	260	N/A		
04/24/96	5110	420	N/A		
05/17/96	5080	3000	N/A	Primary	Secondary
06/10/96	5040	k3600	N/A	Primary	Secondary
08/21/96	1140	k2400	N/A	Primary	Secondary
10/23/96	1190	k390	N/A		
12/17/96	929	k160	N/A		
02/11/97	8000	80	N/A		
04/17/97	6340	140	150		
05/22/97	4760	960	390	Primary	Secondary
06/10/97	4540	460	400		
07/18/97	1420	610	320	Primary	
08/12/97	1580	1100	1600	Primary	Secondary
9/9/97	1510	500	1300		
10/21/97	1000	260	130		
12/16/97	942	440	280		
4/8/98	2350	600	>2100		
5/13/98	4680	>3400	3000	Primary	Secondary
7/15/98	1430	640	1000	Primary	
8/18/98	N/A	510	1100	Primary	

Table 17. Flow and Water Temperature Data Associated with Fecal Coliform Exceedences Near Parma

DATE	Fecal Coliform # / 100 ml	Flow cfs	Water Temperature degrees F	Flow % of Long Term Monthly Mean
6/10/96	K 3600	5040 (>)	59.0	254%
5/17/96	3000	5080 (>)	53.6	173%
8/16/95	K 670	1080 (>)	64.4	146%
5/10/94	1000	587 (<)	65.3	20%
5/12/92	780	308 (<)	59.0	11%
1/16/91	1000	932 (<)	39.2	70%
5/20/91	540	1400 (<)	56.3	48%
9/10/91	620	796 (<)	61.7	82%
5/21/90	980	830 (<)	59.0	28%
7/12/90	510	309 (<)	73.4	32%
5/8/89	1100	1390 (<)	59.9	47%
5/23/88	1000	380 (<)	68.0	41%
7/20/88	K 1000	258 (<)	71.6	26%
5/28/87	2000	1270 (<)	62.6	43%

(>) Flow is greater than long term monthly mean flow, cfs

(<) Flow is less than long term monthly mean flow, cfs

Summary Information, lower Boise River near Parma

- Ten of the primary contact recreation exceedences coincide with flows that are less than the long term monthly average for the month in which

they occur.

- The water temperatures associated with the primary contact recreation exceedences are as follows:

0 - 50 degrees F	none
50 - 60 degrees F	six exceedences
60 - 70 degrees F	six exceedences
70 - 80 degrees F	one exceedence

- The flows and temperatures described above would not preclude the possibility of contact recreation in the lower Boise River near Parma.

Table 18. Indian Creek Upstream Descriptive Statistics
Secondary Contact Recreation

Statistic	Secondary Fecal Exceedences #/100 ml	Water Temperature degrees F	Flows cfs
Maximum	5700	69	120.9
Minimum	900	48	26.6
Average	1522	59	54.1
Median	1200	60	46.2
Std. Deviation	933	6.2	22.3

The water temperatures associated with the upstream fecal coliform problems, like the flows, do not preclude the possibility of contact recreation. The mean and median fecal coliform measurements show that the risk of illness from ingestion of Indian Creek water is moderate.

Table 19. Indian Creek Downstream Descriptive Statistics
Secondary Contact Recreation

Statistic	Secondary Fecal Exceedences #/100 ml	Water Temperature degrees F	Flows cfs
Maximum	14300	71	120.9
Minimum	900	50	18.1
Average	1852	60.1	54.6
Median	1200	60	46.0
Std. Deviation	2157	5.3	25.2

Due to the small size of the Nampa waste water discharge and the proximity of the upstream and downstream monitoring site on Indian Creek, the flows associated with the downstream fecal coliform bacteria

problems are quite similar to the upstream flows. Again, contact recreation is not precluded by the size of the flows, nor by the water temperatures.